AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1.   (currently amended): An AES encryption processor comprising:

a selector unit selecting an element of a state in response to row and column indices;

a substitution unit for obtaining a substitution value with said selected element used as an index;

a coefficient table providing first to fourth coefficients in response to said row index;

first to fourth multipliers respectively computing first to fourth products, which are obtained by multiplication of said substitution value with the first to fourth coefficients, respectively, the first to fourth products corresponding to said selected element ~~a same one column of the state~~; and

an accumulator which accumulates the first to fourth products corresponding to all ~~four columns~~ elements of a column of the state to develop first to fourth elements of a designated column of a resultant state,

wherein the first to fourth multipliers are Galois field multipliers.

2.   (original): The AES encryption processor according to claim 1, wherein said first to fourth coefficients are respectively set

to {02}, {01}, {01}, and {03} in response to said row index selecting a first row of said

state,

to {03}, {02}, {01}, and {01} in response to said row index selecting a second row of

said state,

to {01}, {03}, {02}, and {01} in response to said row index selecting a third row of said

state, and

to {01}, {01}, {03}, and {02} in response to said row index selecting a fourth row of said

state.

3.   (previously presented): An AES encryption processor adapted to an AES

instruction including first and second operands respectively selecting input and output registers

out of a register file, and an immediate operand selecting a row of a state, said AES encryption

processor comprising:

a selector unit selecting an element of said state in response to said first operand and said

immediate operand, said selected element being stored in said input register;

a S-box for obtaining a substitution value with said selected element used as an index;

a coefficient table providing first to fourth coefficients in response to said immediate

operand;

· first to fourth Galois field multipliers respectively computing first to fourth products,

which are obtained by multiplication of said substitution value with first to fourth coefficients,

respectively; and

a storing unit for storing said first to fourth products into said output register selected by

said second operand.

4.   (original): The AES encryption processor according to claim 3, further

comprising a processing unit adapted to implement XORing,

wherein said AES encryption processor is further adapted to an XOR instruction, and

wherein said processing unit implements XORing of values contained in two selected

registers of said register file.

5.   (original): The AES encryption processor according to claim 1, wherein said first

to fourth coefficients are respectively set

to {02}, {01}, {01}, and {03} in response to said row index selecting a first row of said

state,

to {03}, {02}, {01}, and {01} in response to said row index selecting a second row of

said state,

to {01}, {03}, {02},and {01} in response to said row index selecting a third row of said

state, and

to {01}, {01}, {03}, and {02} in response to said row index selecting a fourth row of said

state.

6.   (previously presented): An AES decryption processor comprising:

a selector unit selecting an element of a state in response to row and column indices;

an inverse S-box for obtaining a substitution value with said selected element used as an

index;

a coefficient table providing first to fourth coefficients in response to said row index;

first to fourth Galois field multipliers respectively computing first to fourth products,

which are obtained by multiplication of said substitution value with first to fourth coefficients,

respectively; and

an accumulator which accumulates the first to fourth products to develop first to fourth

elements of a designated column of a resultant state.

7.   (previously presented): The AES decryption processor according to claim 6,

wherein said first to fourth coefficients are respectively set

to {02}, {01}, {01}, and {03} in response to said row index selecting a first row of said

state,

to {03}, {02}, {01}, and {01} in response to said row index selecting a second row of

said state,

to {01}, {03}, {02}, and {01} in response to said row index selecting a third row of said

state, and

to {01}, {01}, {03}, and {02} in response to said row index selecting a fourth row of said

state.

8.   (previously presented): An AES decryption processor adapted to an AES

instruction including first and second operands respectively selecting input and output registers

out of a register file, and an immediate operand selecting a row of a state, said AES decryption

processor comprising:

a selector unit selecting an element of said state in response to said first operand and said

immediate operand, said selected element being stored in said input register;

a S-box for obtaining a substitution value with said selected element used as an index;

a coefficient table providing first to fourth coefficients in response to said immediate

operand;

first to fourth Galois field multipliers respectively computing first to fourth products,

which are obtained by multiplication of said substitution value with first to fourth coefficients,

respectively; and

a storing unit for storing said first to fourth products into said output register selected by

said second operand.

9.   (previously presented): The AES decryption processor according to claim 8,

further comprising a processing unit adapted to implement XORing,

wherein said AES decryption processor is further adapted to an XOR instruction, and

wherein said processing unit implements XORing of values contained in two selected

registers of said register file.

10.   (original): The AES encryption processor according to claim 8, wherein said first

to fourth coefficients are respectively set

to {02}, {01}, {01}, and {03} in response to said row index selecting a first row of said

state,

to {03}, {02}, {01}, and {01} in response to said row index selecting a second row of

said state,

to {01}, {03}, {02}, and {01} in response to said row index selecting a third row of said

state, and

to {01}, {01}, {03}, and {02} in response to said row index selecting a fourth row of said

state.

11.   (previously presented): An AES processor comprising:

a first selector unit selecting an element of a state in response to row and column indices;

an inverse affine transformation circuit applying an inverse affine transformation on said

selected element;

a second selector unit selecting one out of two data bytes consisting of said selected

element received from said first selector, and a result of said inverse affine transformation

received said inverse affine transformation circuit, wherein said selected element is selected for

encryption, while said result of said inverse affine transformation is selected for decryption;

an inverse determining unit obtaining a multiplicative inverse of said selected data byte

received from said second selector;

an affine transformation circuit applying an affine transformation on said obtained

multiplicative inverse;

a third selector unit selecting one of two data bytes consisting of said multiplicative

inverse received from said inverse determining unit, and a result of said affine transformation

received from affine transformation circuit, wherein said result of said affine transformation is

selected for decryption, while said multiplicative inverse is selected for encryption;

a coefficient table providing first to fourth coefficients in response to said row index;

first to fourth Galois field multipliers respectively computing first to fourth products,

which are obtained by multiplication of said substitution value with first to fourth coefficients,

respectively; and

an accumulator which accumulates the first to fourth products to develop first to fourth

elements of a designated column of a resultant state.

12.   (previously presented): An AES processor adapted to an AES instruction

including first and second operands respectively selecting input and output registers out of a

register file, and an immediate operand selecting a row of a state, said AES processor

comprising:

a first selector unit selecting an element of said state in response said first operand and

said immediate operand, said selected element being stored in said input register;

an inverse affine transformation circuit applying an inverse affine transformation on said

selected element;

a second selector unit selecting one out of two data bytes consisting of said selected

element received from said first selector, and a result of said inverse affine transformation

received said inverse affine transformation circuit, wherein said selected element is selected for

encryption, while said result of said inverse affine transformation is selected for decryption;

an inverse determining unit obtaining a multiplicative inverse of said selected data byte

received from said second selector; an affine transformation circuit applying an affine

transformation on said obtained multiplicative inverse;

a third selector unit selecting one of two data bytes consisting of said multiplicative

inverse received from said inverse determining unit, and a result of said affine transformation

received from affine transformation circuit, wherein said result of said affine transformation is

selected for decryption, while said multiplicative inverse is selected for encryption;

a coefficient table providing first to fourth coefficients in response to said row index;

first to fourth Galois field multipliers respectively computing first to fourth products,

which are obtained by multiplication of said substitution value with first to fourth coefficients,

respectively; and

a storing unit for storing said first to fourth products into said output register selected by

said second operand.

13.   (original): The AES processor according to claim 12, further comprising a

processing unit adapted to implement XORing,

wherein said AES processor is further adapted to an XOR instruction, and

wherein said processing unit implements XORing of values contained in two selected

registers of said register file.

14.   (previously presented): An AES processor adapted to an AES instruction

including first and second operands respectively selecting input and output registers out of a

register file, and an immediate operand selecting a row of a state(s), said AES processor

comprising:

a plurality of AES processor cores respectively associated with a plurality of columns of

said state(s); and

a coefficient table providing first to fourth coefficients in response to said immediate

operand;

wherein each of said plurality of AES processor cores includes: a first selector unit

selecting an element of said state(s) in response said first operand and said immediate operand,

said selected element being stored in said input register, an inverse affine transformation circuit

applying an inverse affine transformation on said selected element, a second selector unit

selecting one out of two data bytes consisting of said selected element received from said first

selector, and a result of said inverse affine transformation received said inverse affine

transformation circuit,

wherein said selected element is selected for encryption, while said result of said inverse

affine transformation is selected for decryption, an inverse determining unit obtaining a

multiplicative inverse of said selected data byte received from said second selector, an affine

transformation circuit applying an affine transformation on said obtained multiplicative inverse,

a third selector unit selecting one of two data bytes consisting of said multiplicative inverse

received from said inverse determining unit, and a result of said affine transformation received

from affine transformation circuit,

wherein said result of said affine transformation is selected for decryption, while said

multiplicative inverse is selected for encryption, first to fourth Galois field multipliers

respectively computing first to fourth products, which are obtained by multiplication of said

substitution value with first to fourth coefficients, respectively, and a storing unit for storing said

first to fourth products into said output register selected by said second operand.

15.   (canceled).

16.   (previously presented): The AES encryption processor according to claim 1,

wherein the selector unit also selects other elements of the state in response to the row and

column indices, respectively, and the substitution unit also obtains other substitution values of

each of the other selected elements of the state with each of the other selected elements used as

an index, respectively.

17.   (currently amended): The AES encryption processor according to claim 16,

wherein the first to fourth multipliers respectively, also compute other first to fourth products,

which are obtained by multiplying said substitution values of the each of the other selected

elements with the first to fourth coefficients, respectively, each of the other first to fourth

products corresponding to different ~~columns of~~ elements of the state.

18.   (canceled).

19.   (currently amended): The AES encryption processor according to claim 1,

wherein the accumulator adds the first to fourth products corresponding to all elements of a

column of the state ~~each of the four columns of the state~~ to develop first to fourth elements of the

designated column of the resultant state.

20.   (previously presented): The AES encryption processor according to claim 1,

wherein the substitution value is provided to the first to fourth multipliers.